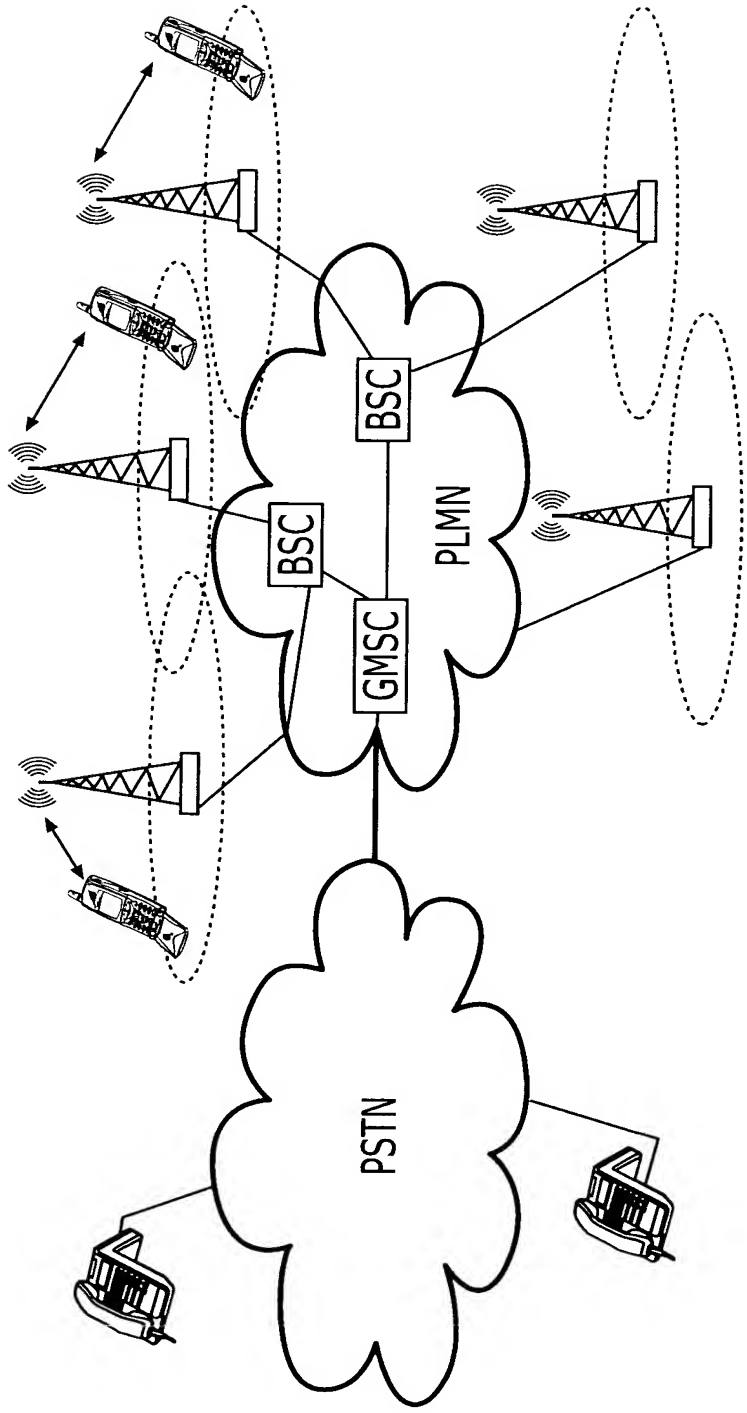

FIGURE 1
(PRIOR ART)

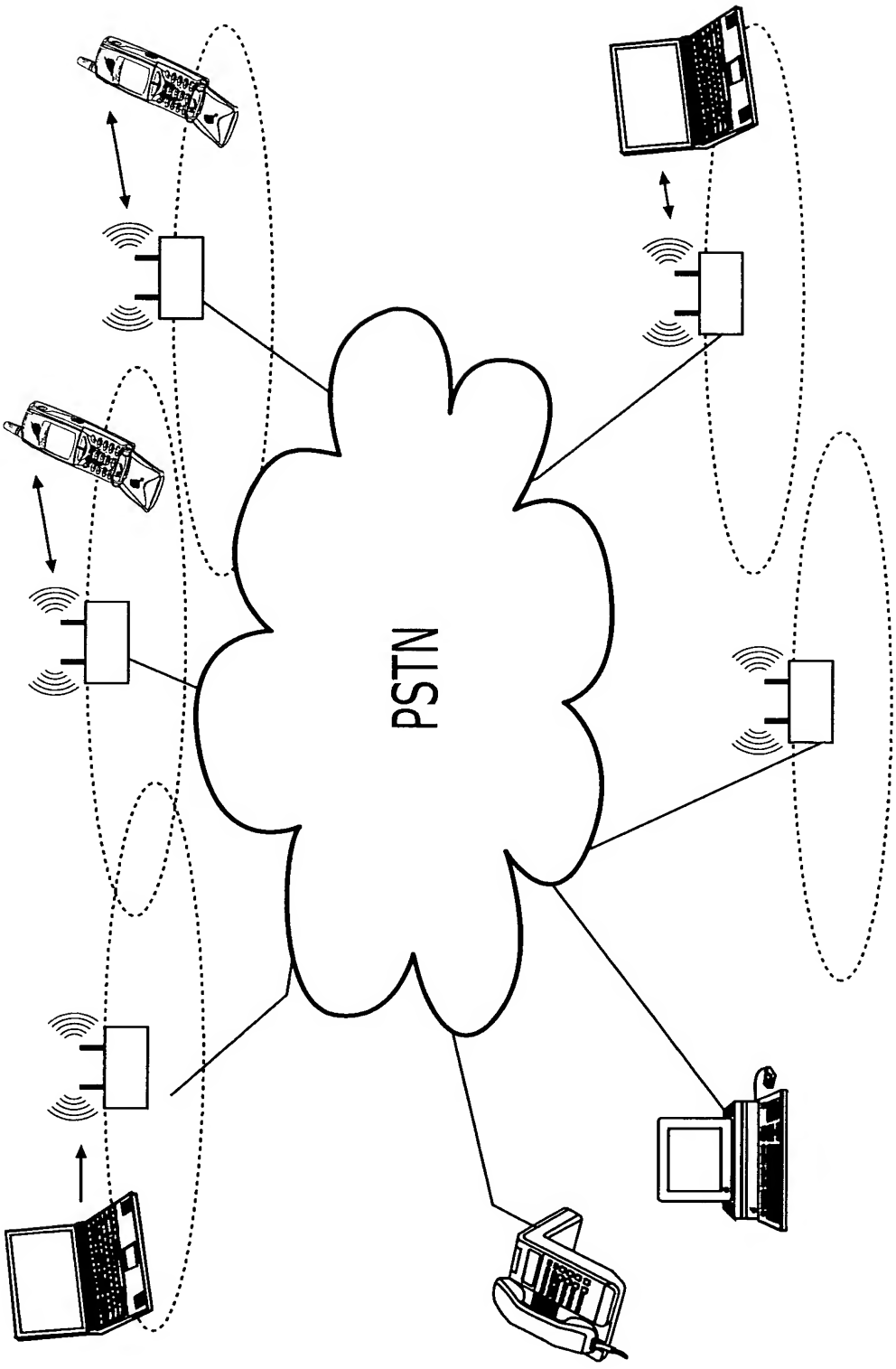

FIGURE 2
(PRIOR ART)

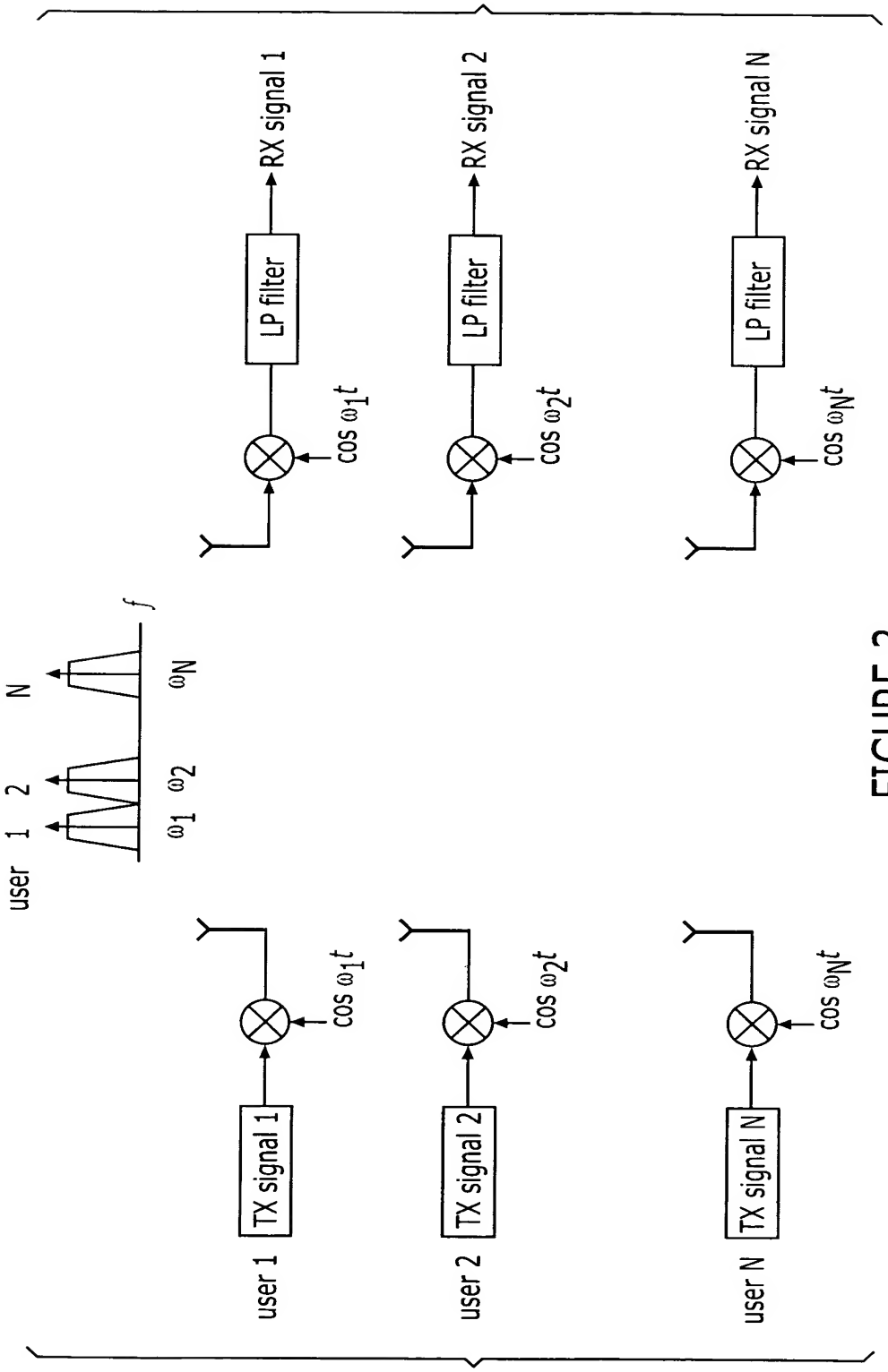

FIGURE 3
(PRIOR ART)

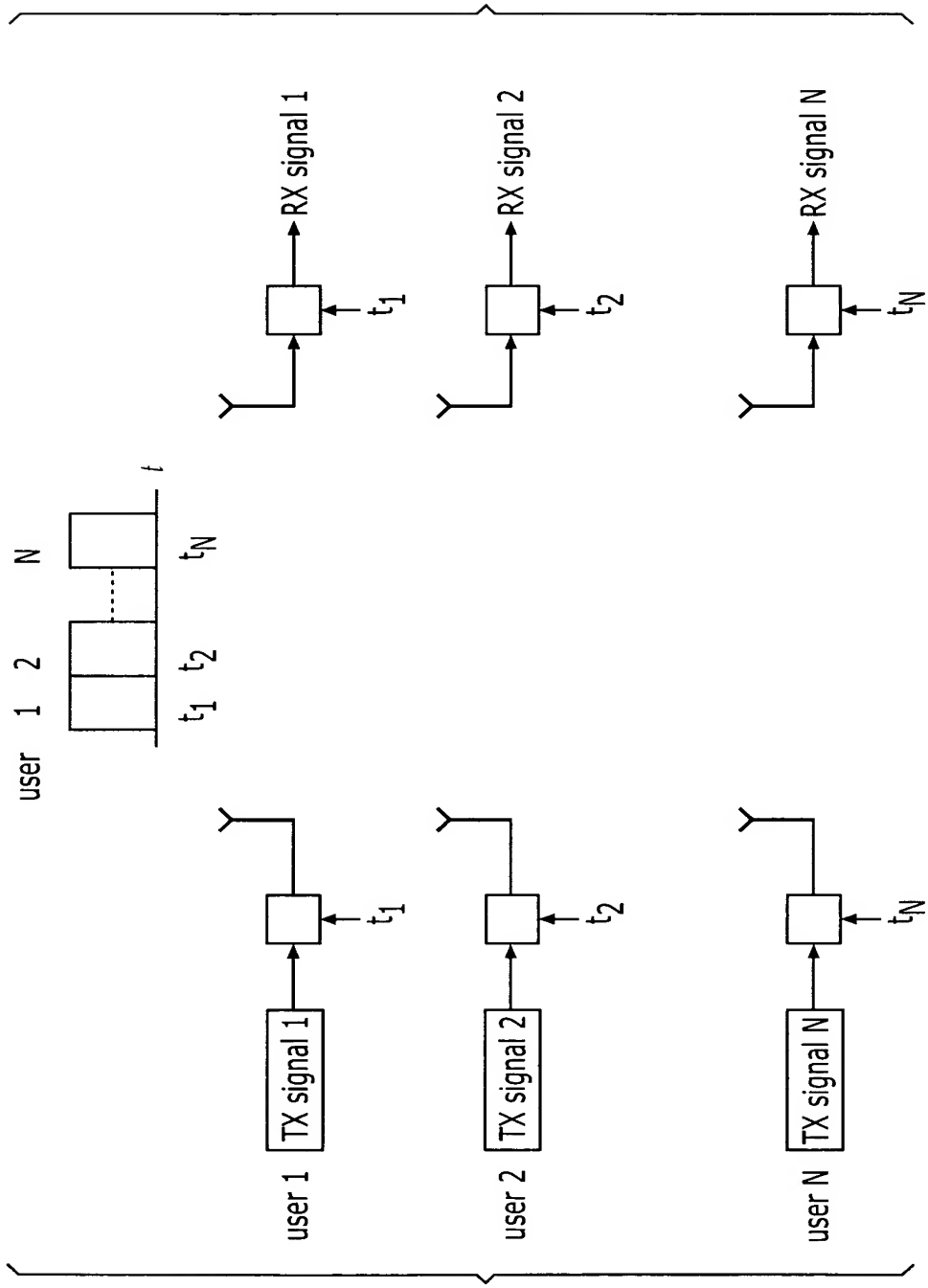

FIGURE 4
(PRIOR ART)

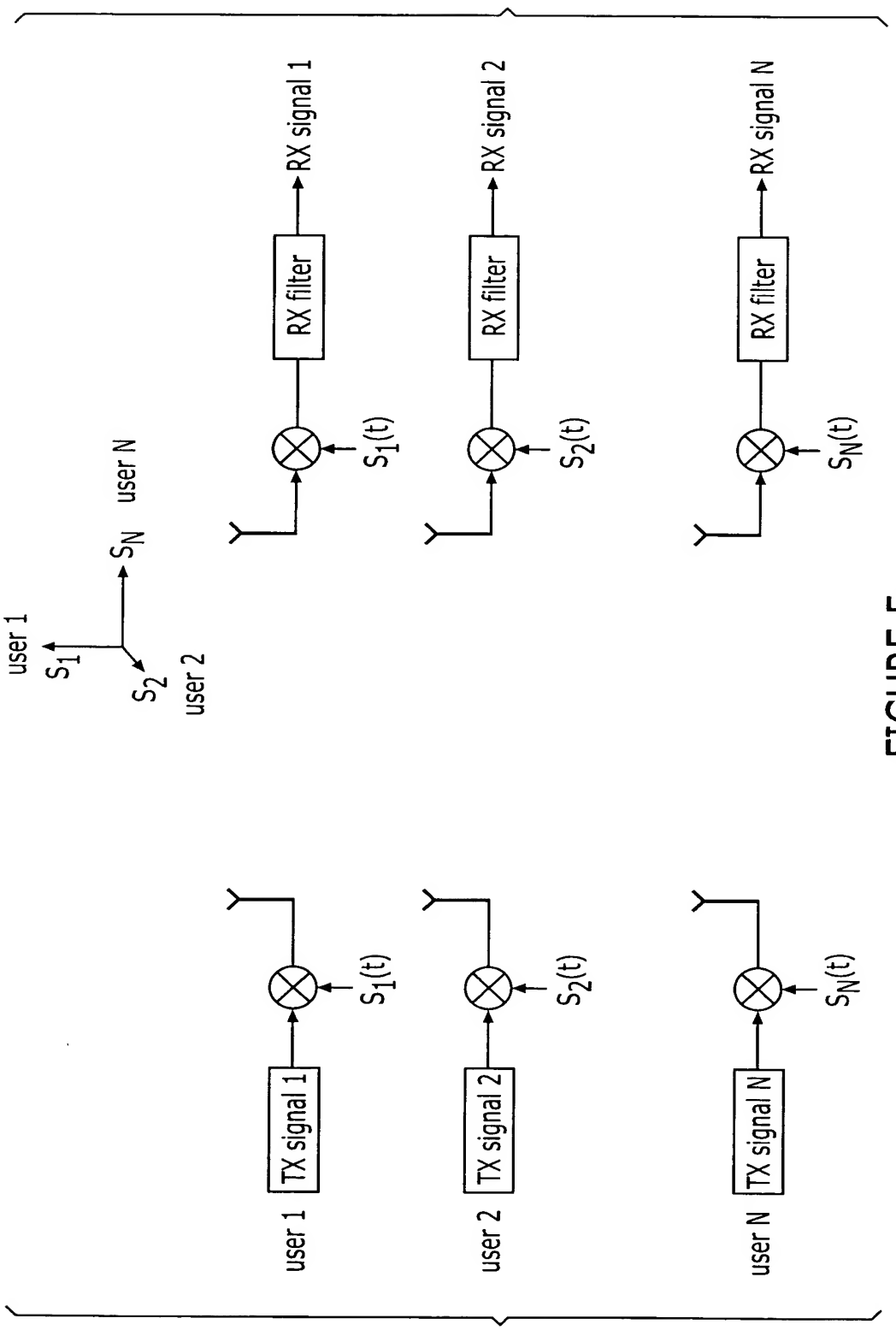

FIGURE 5
(PRIOR ART)

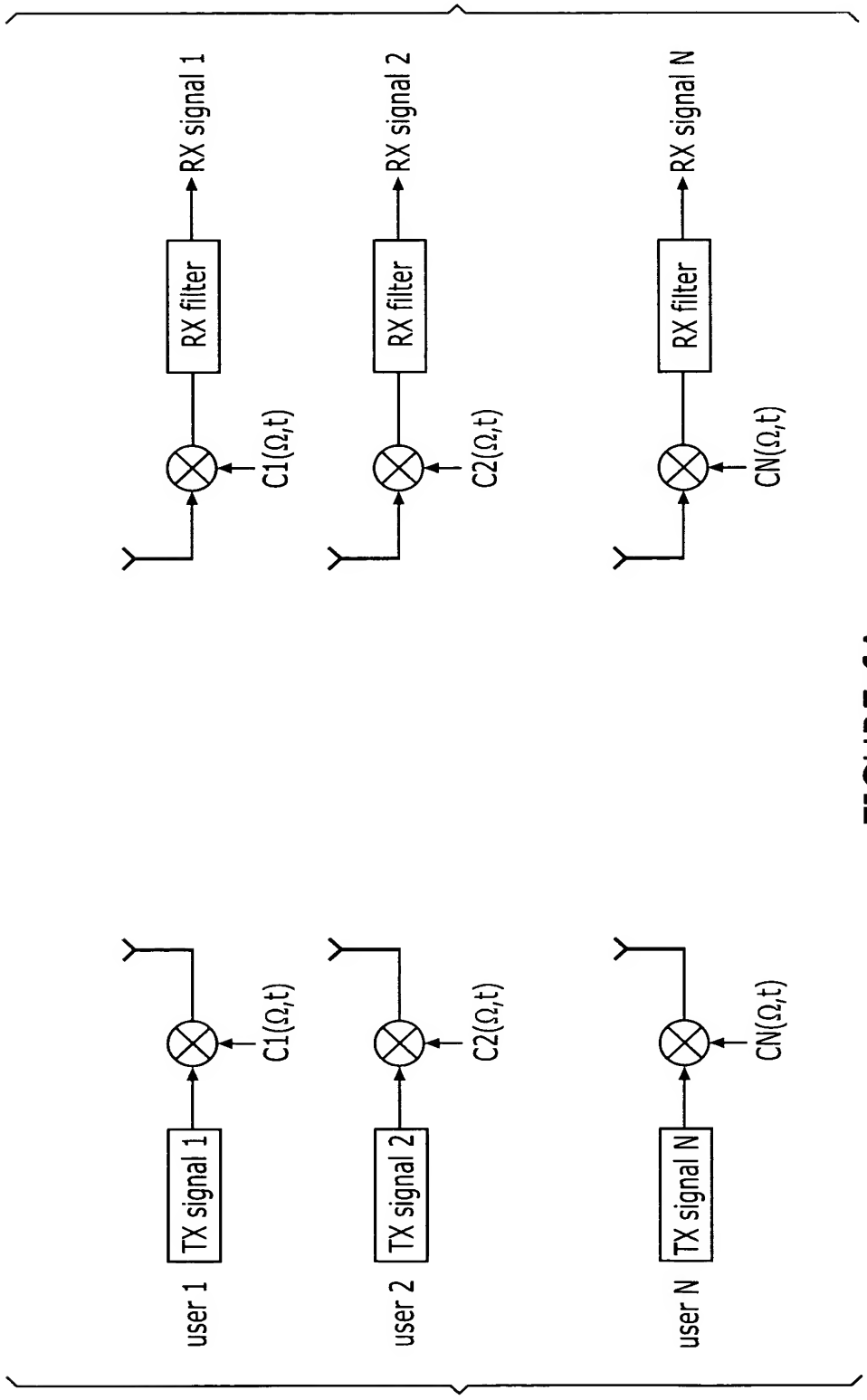

FIGURE 6A
(PRIOR ART)

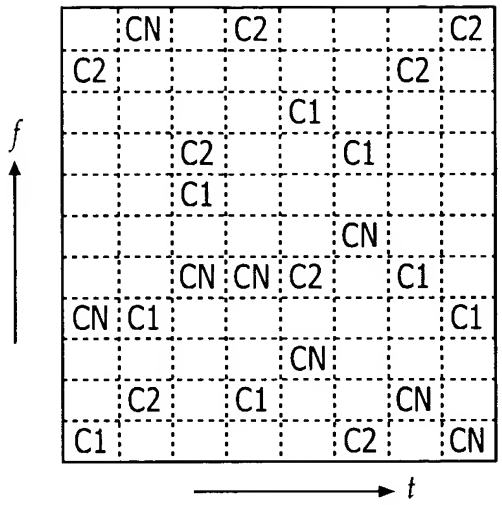

FIGURE 6B
(PRIOR ART)

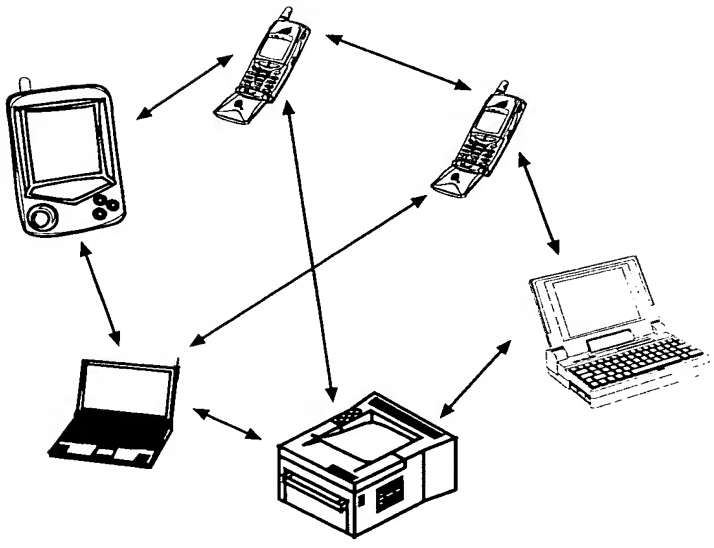

FIGURE 7
(PRIOR ART)

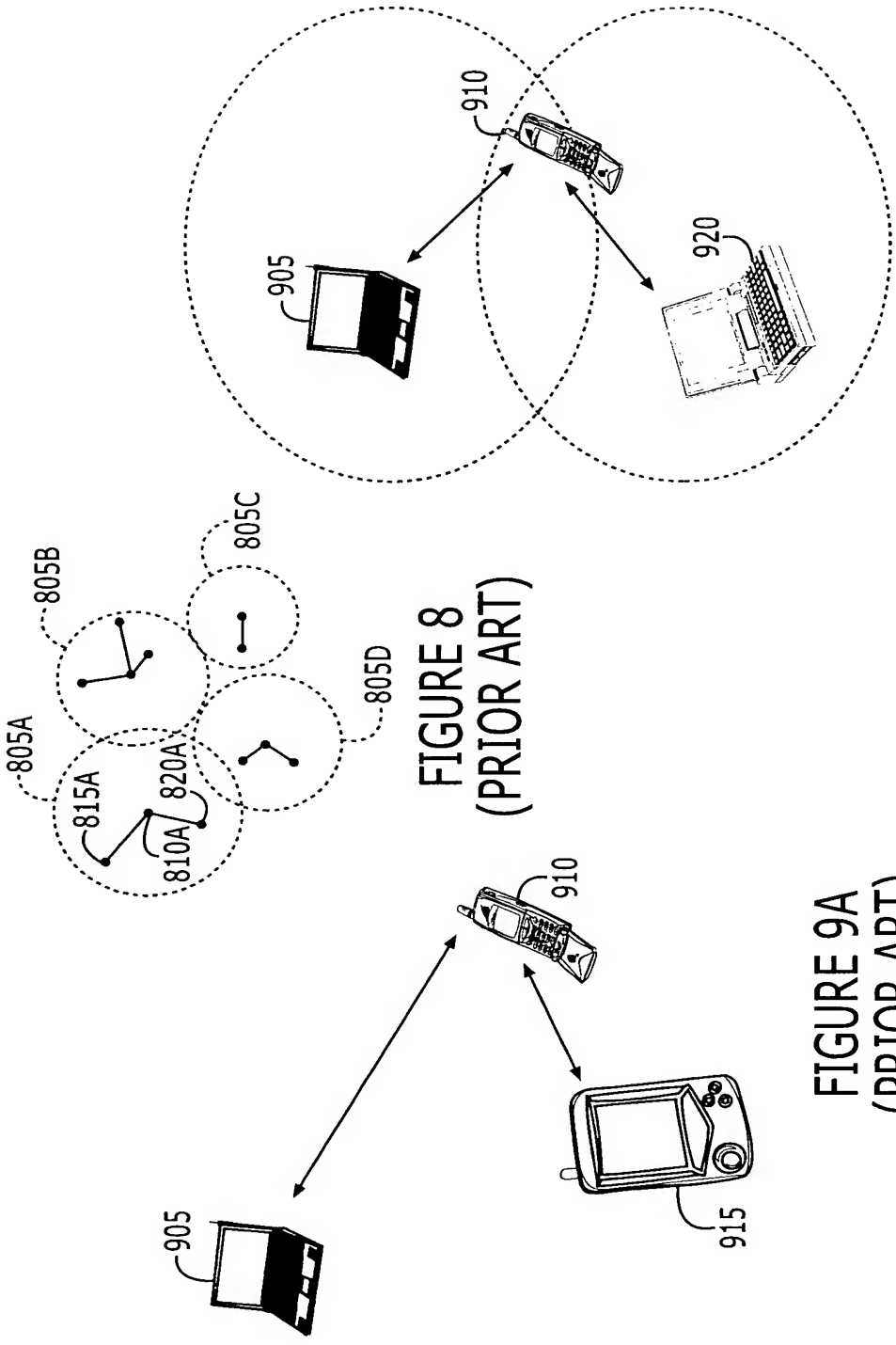

FIGURE 9A
(PRIOR ART)

FIGURE 8
(PRIOR ART)

FIGURE 9B
(PRIOR ART)

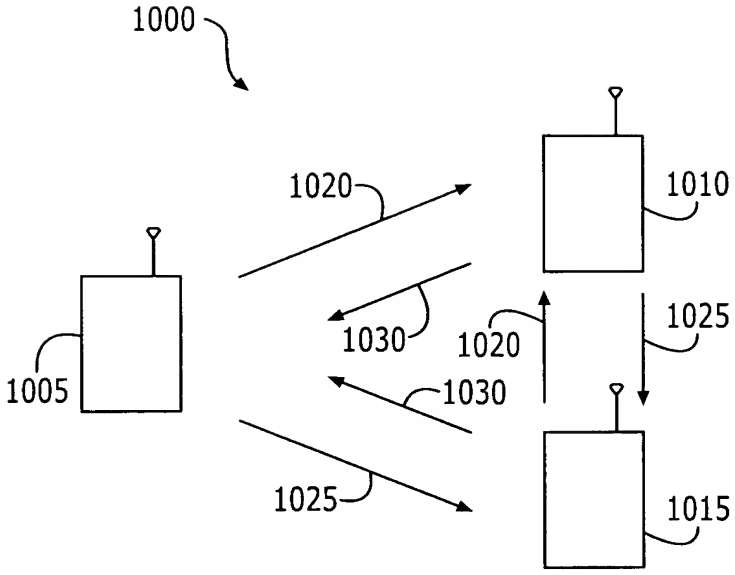

FIGURE 10

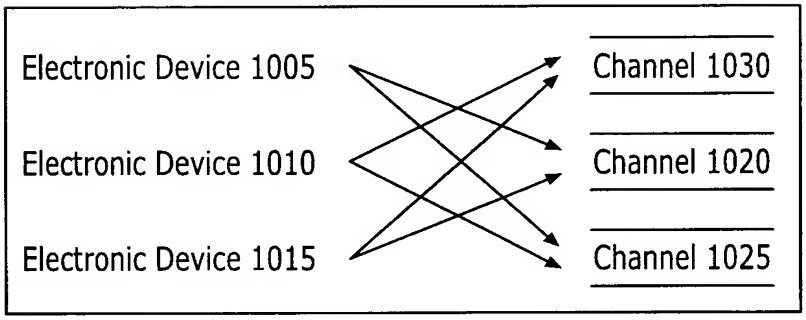

FIGURE 11

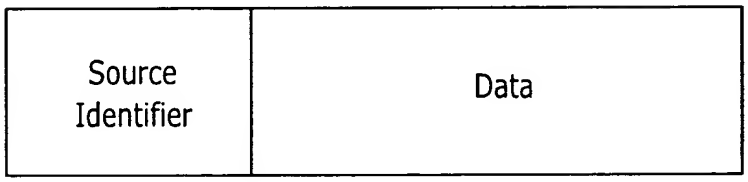

FIGURE 12

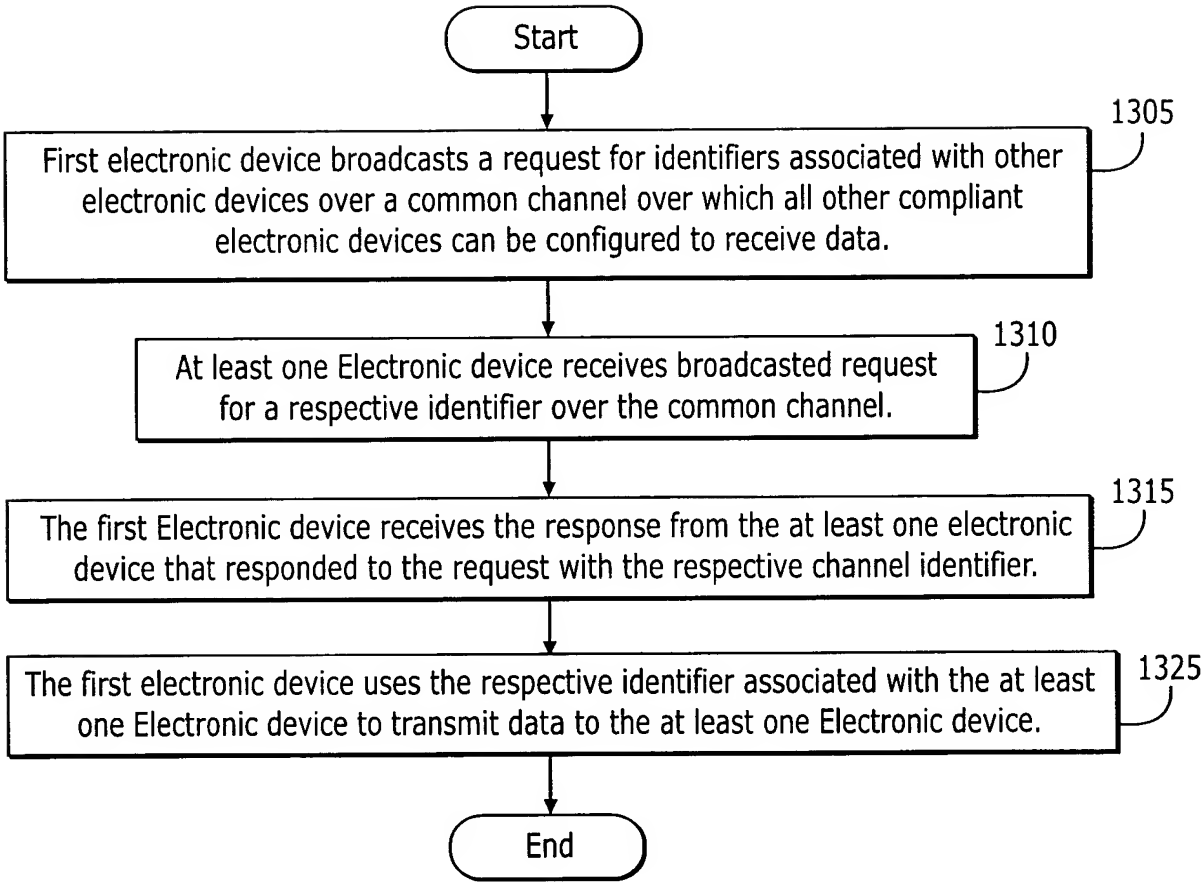
Start
First electronic device broadcasts a request for identifiers associated with other electronic devices over a common channel over which all other compliant electronic devices can be configured to receive data.
1305
At least one Electronic device receives broadcasted request for a respective identifier over the common channel.
1310
The first Electronic device receives the response from the at least one electronic device that responded to the request with the respective channel identifier.
1315
The first electronic device uses the respective identifier associated with the at least one Electronic device to transmit data to the at least one Electronic device.
1325
End

FIGURE 13

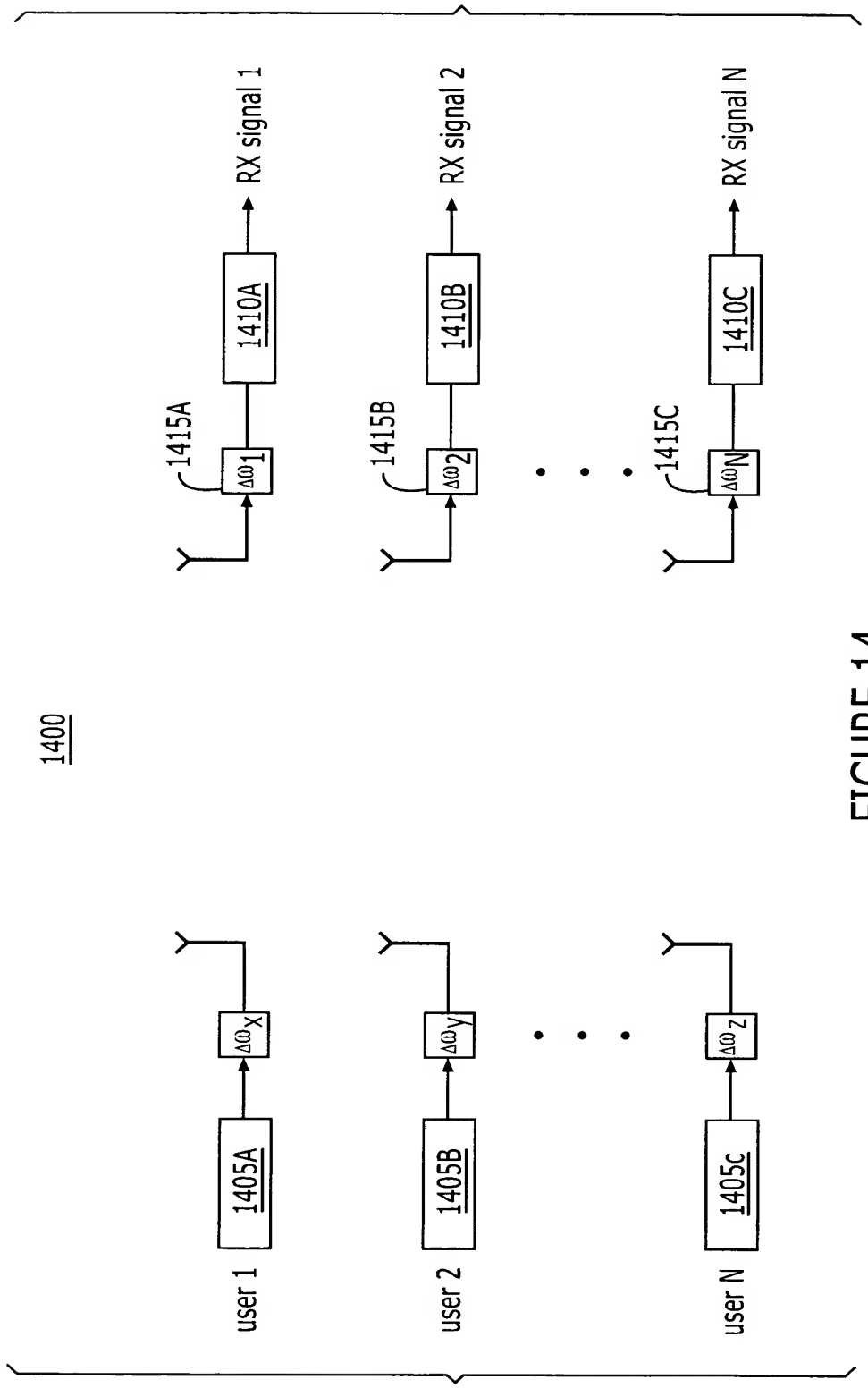
1400
user 1
1405A
Δω x
user 2
1405B
Δω y
user N
1405c
Δω z
1415A
Δω 1
1410A
RX signal 1
1415B
Δω 2
1410B
RX signal 2
1415C
Δω N
1410C
RX signal N

FIGURE 14

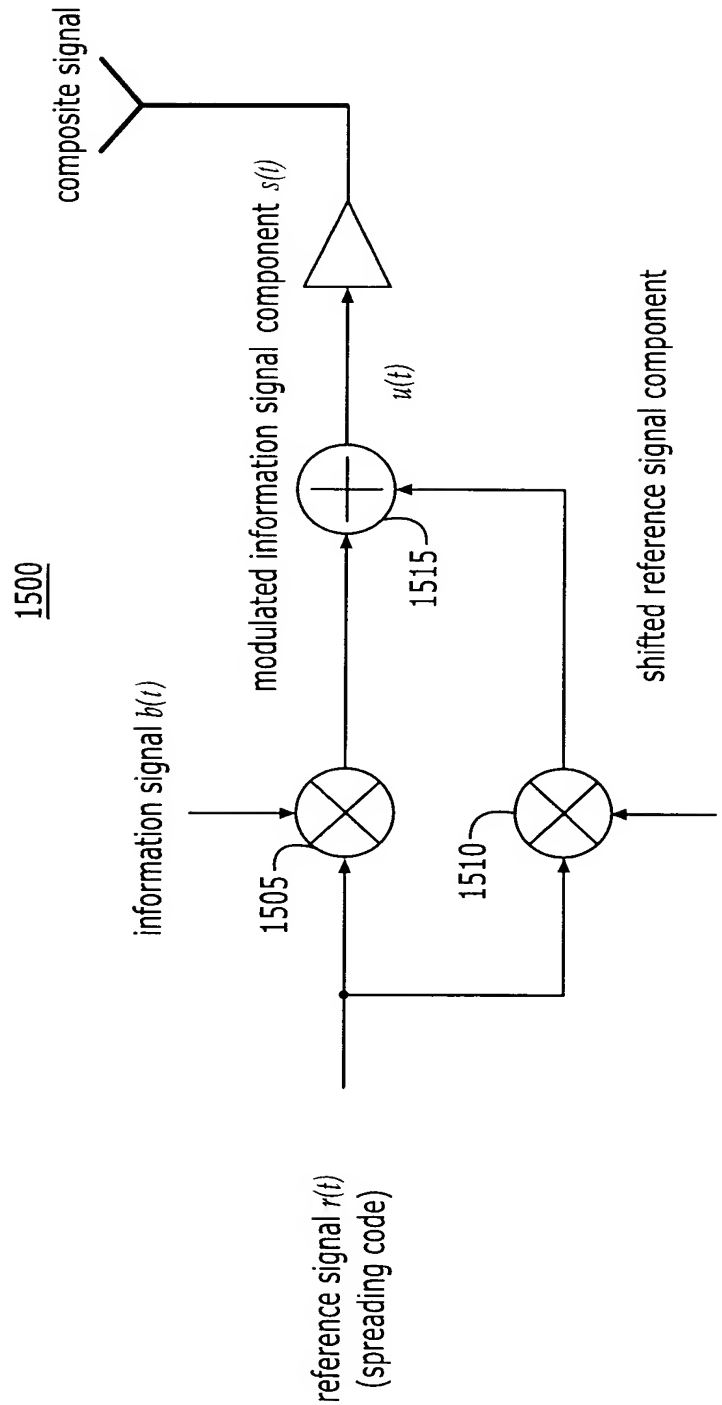
composite signal
1500
modulated information signal component s(t)
u(t)
1515
information signal b(t)
1505
1510
shifted reference signal component
frequency offset (cos(Δωt))
reference signal r(t)
(spreading code)

FIGURE 15

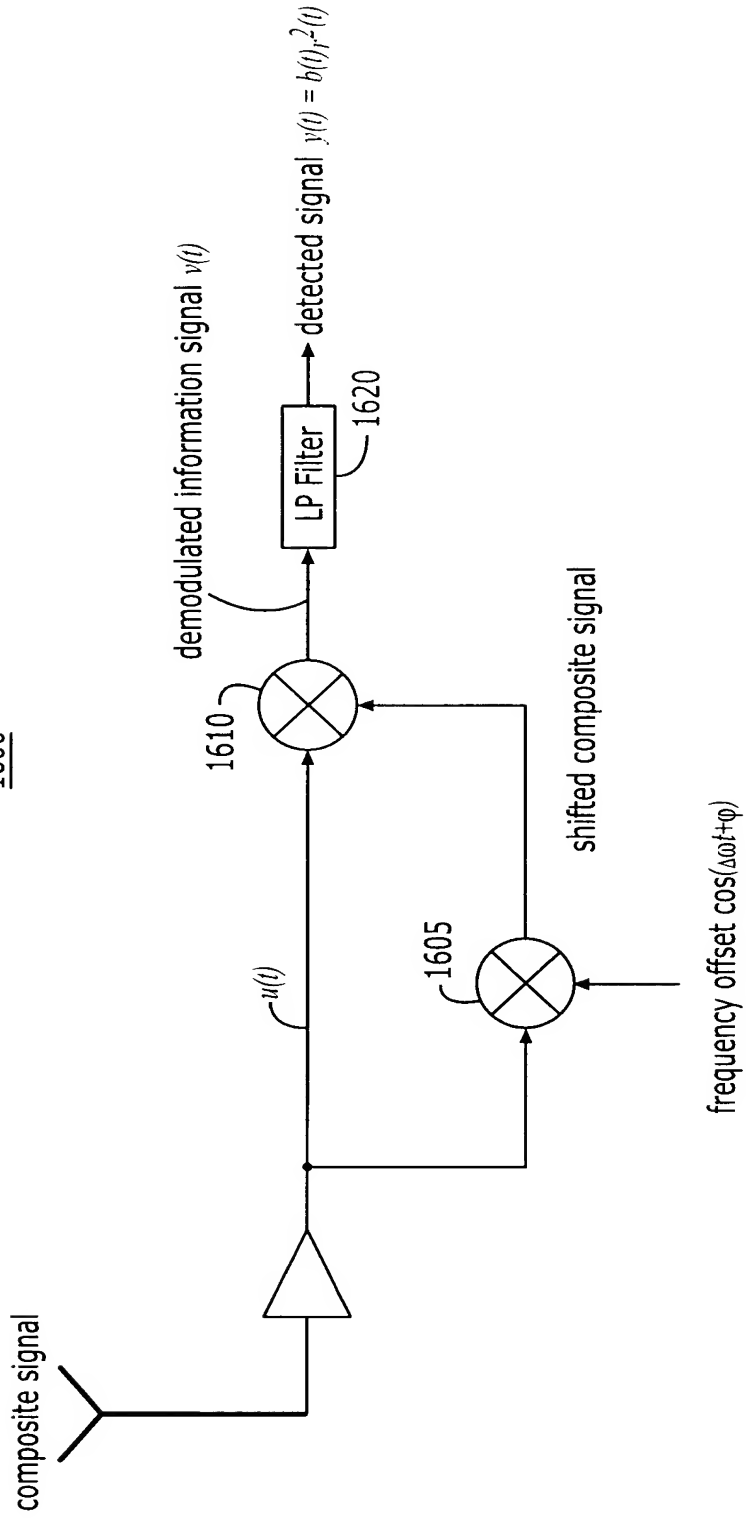
1600
composite signal
u(t)
1610
demodulated information signal v(t)
detected signal y(t) = b(t)r^2(t)
LP Filter
1620
1605
shifted composite signal
frequency offset cos(Δωt+φ)

FIGURE 16

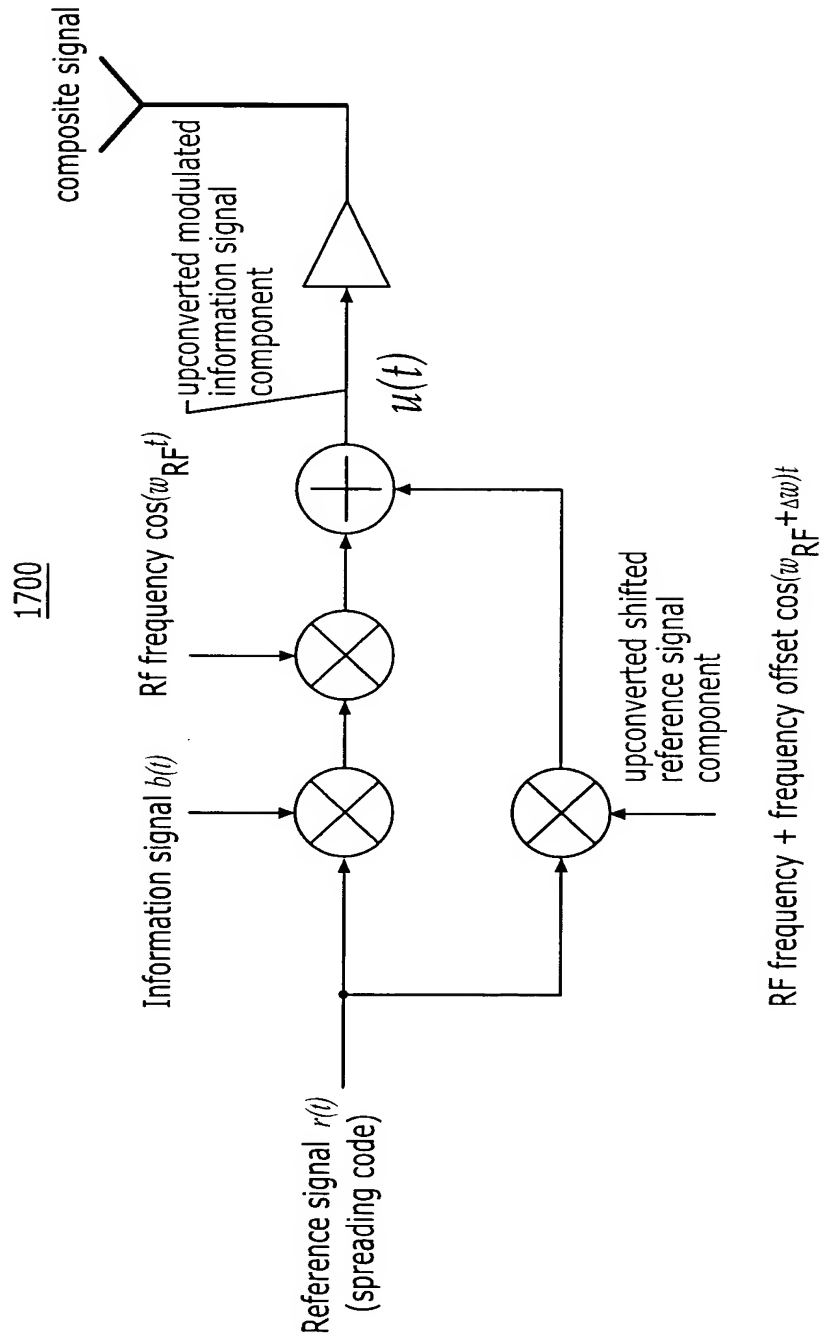
1700
composite signal
upconverted modulated information signal component
u(t)
Rf frequency cos(w_RF t)
Information signal b(t)
upconverted shifted reference signal component
Reference signal r(t) (spreading code)
RF frequency + frequency offset cos(w_RF+Δw)t

FIGURE 17

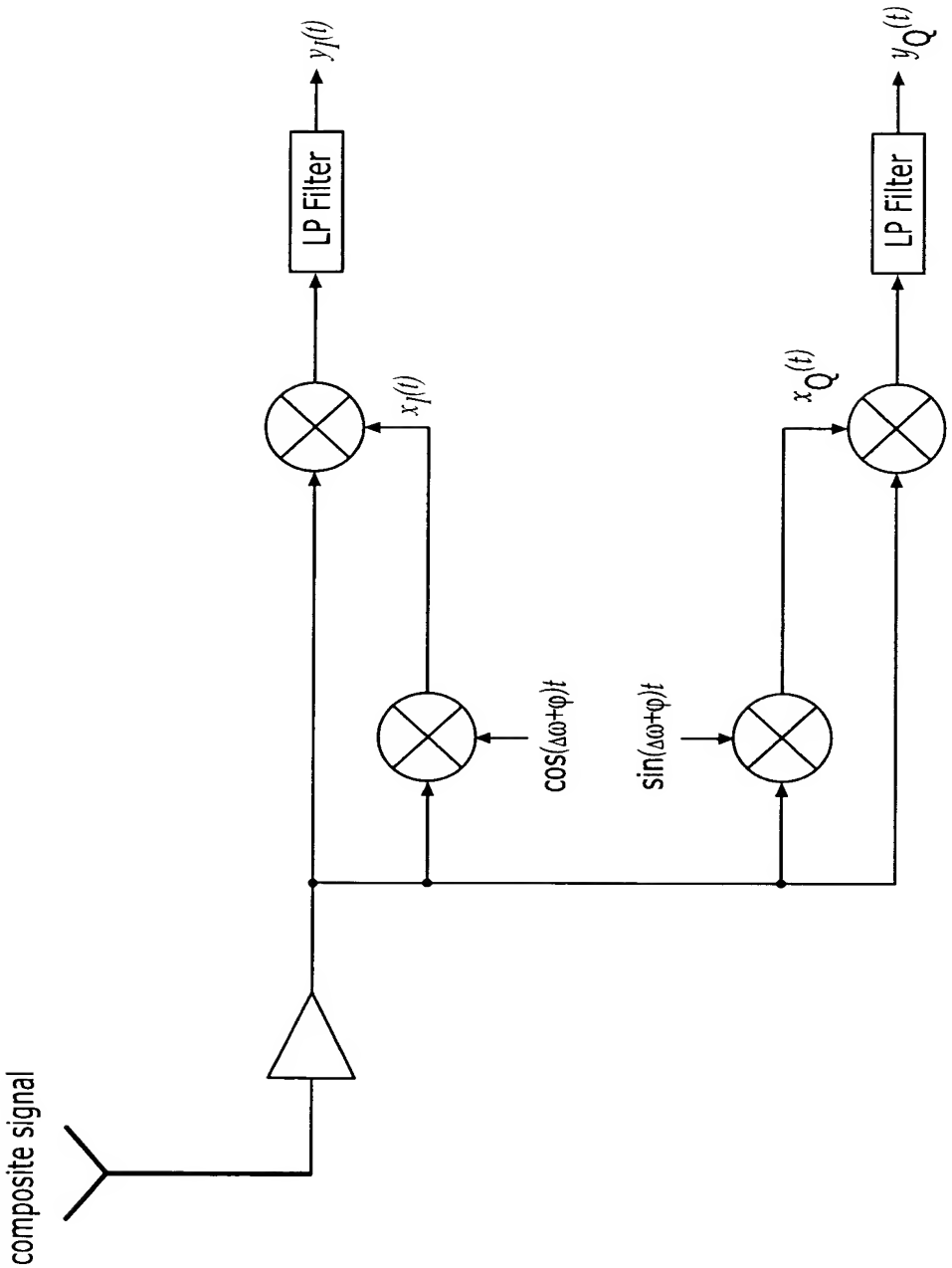
composite signal
LP Filter
LP Filter
$y_I(t)$
$y_Q(t)$
$x_I(t)$
$x_Q(t)$
$\cos(\Delta\omega+\phi)t$
$\sin(\Delta\omega+\phi)t$

FIGURE 18

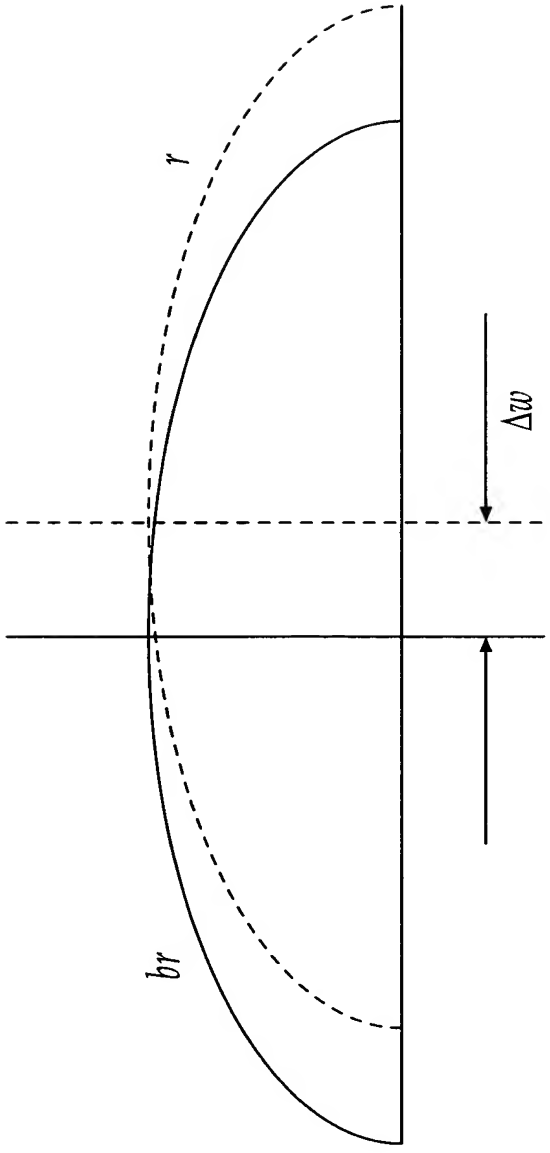

FIGURE 19

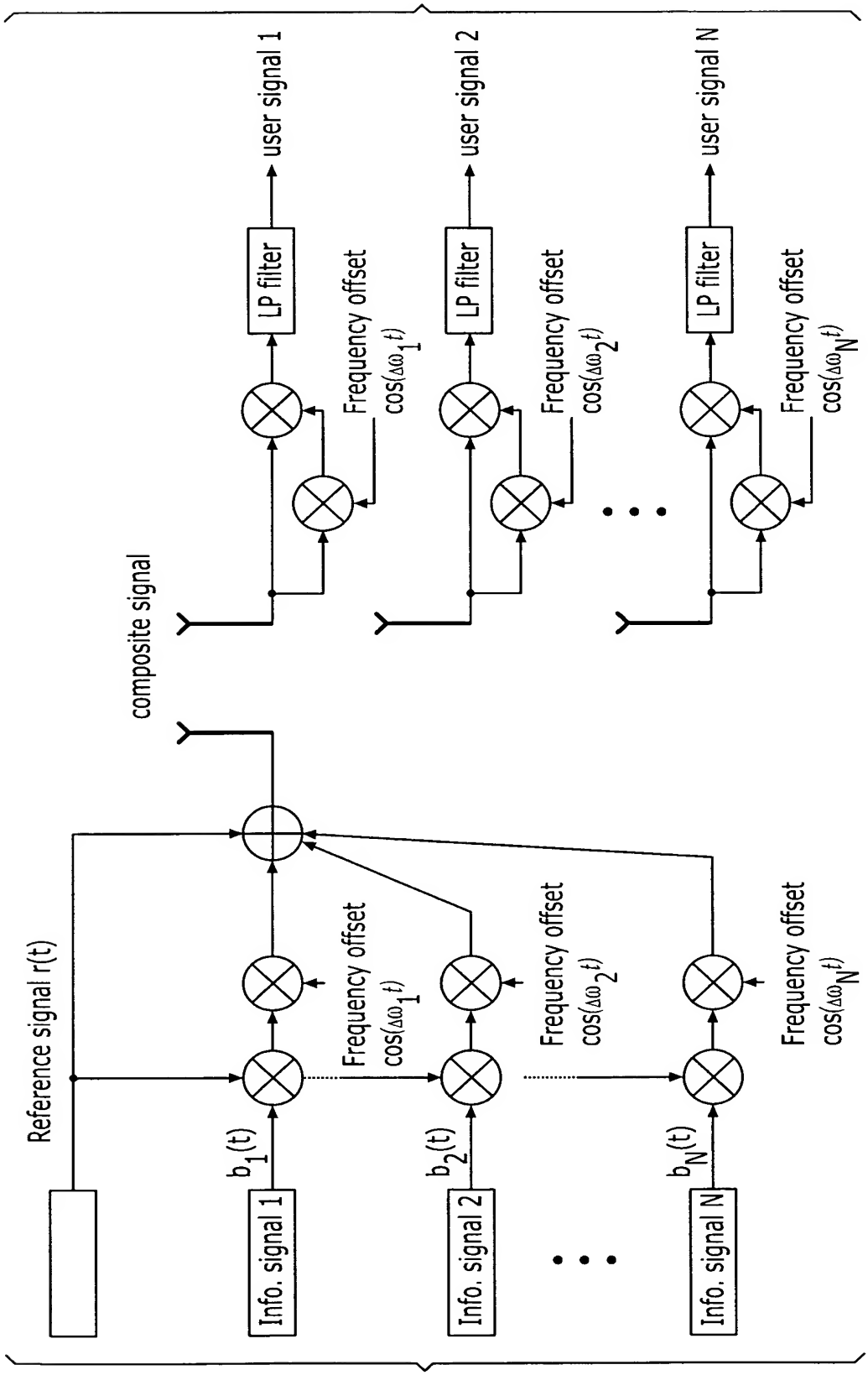
Reference signal r(t)
Info. signal 1
Info. signal 2
Info. signal N
$b_1(t)$
$b_2(t)$
$b_N(t)$
Frequency offset $\cos(\Delta\omega_1 t)$
Frequency offset $\cos(\Delta\omega_2 t)$
Frequency offset $\cos(\Delta\omega_N t)$
composite signal
LP filter
LP filter
LP filter
user signal 1
user signal 2
user signal N
Frequency offset $\cos(\Delta\omega_1 t)$
Frequency offset $\cos(\Delta\omega_2 t)$
Frequency offset $\cos(\Delta\omega_N t)$

FIGURE 20

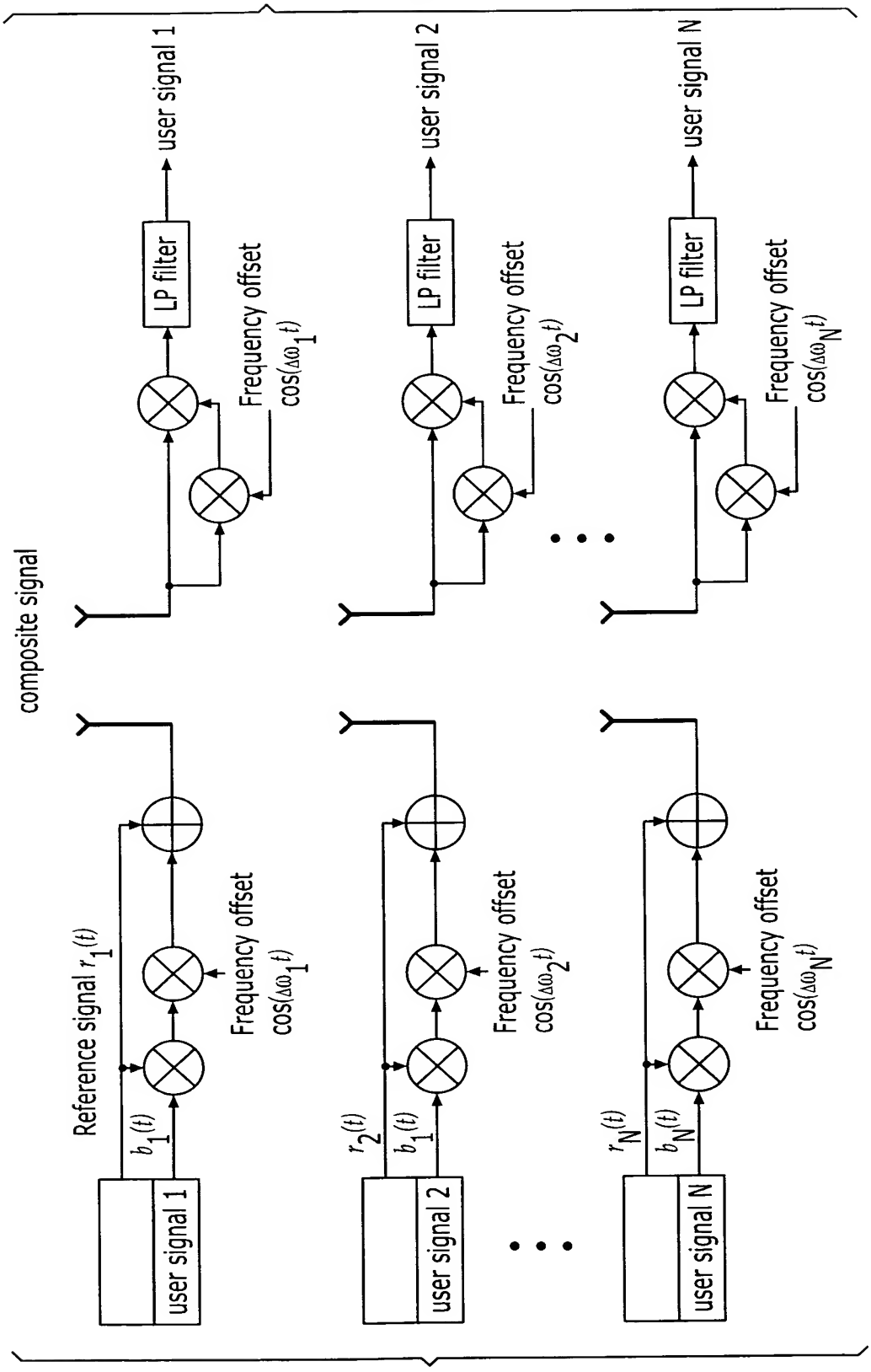
composite signal
user signal 1
user signal 2
user signal N
Reference signal $r_1(t)$
$b_1(t)$
$r_2(t)$
$b_2(t)$
$r_N(t)$
$b_N(t)$
Frequency offset $\cos(\Delta\omega_1 t)$
Frequency offset $\cos(\Delta\omega_2 t)$
Frequency offset $\cos(\Delta\omega_N t)$
LP filter
LP filter
LP filter
user signal 1
user signal 2
user signal N

FIGURE 21

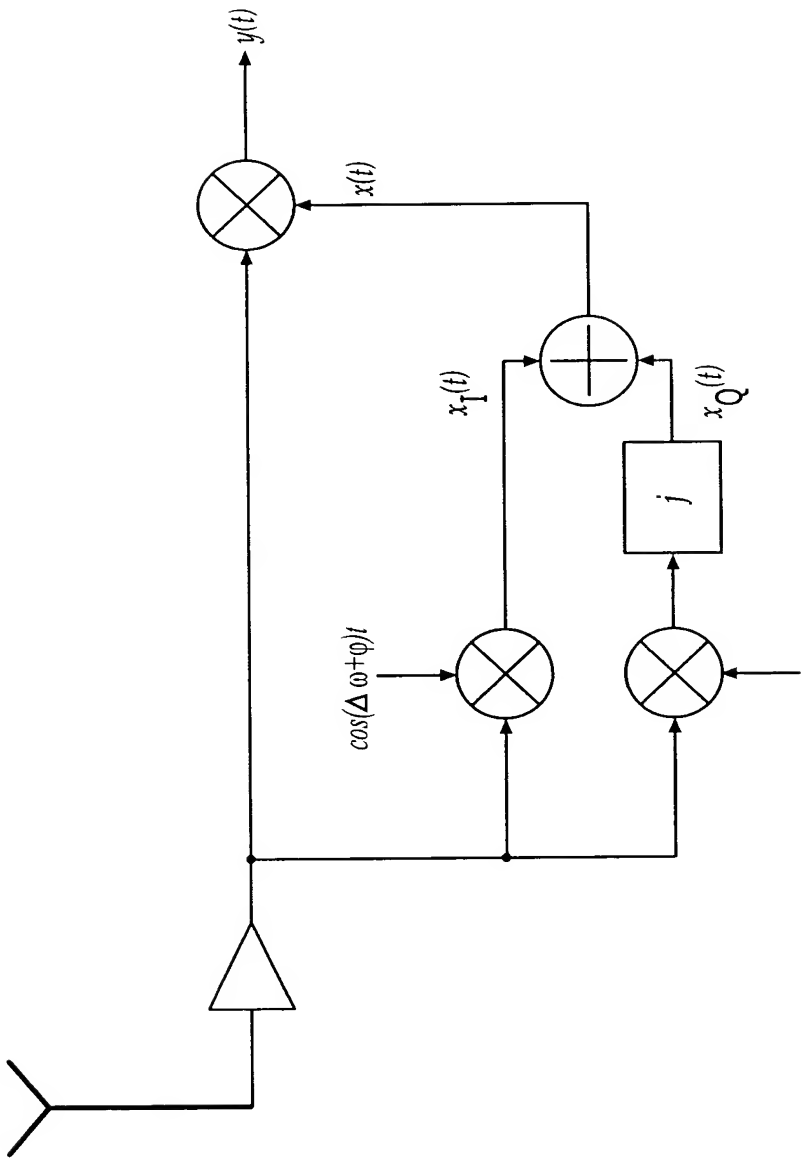

FIGURE 22

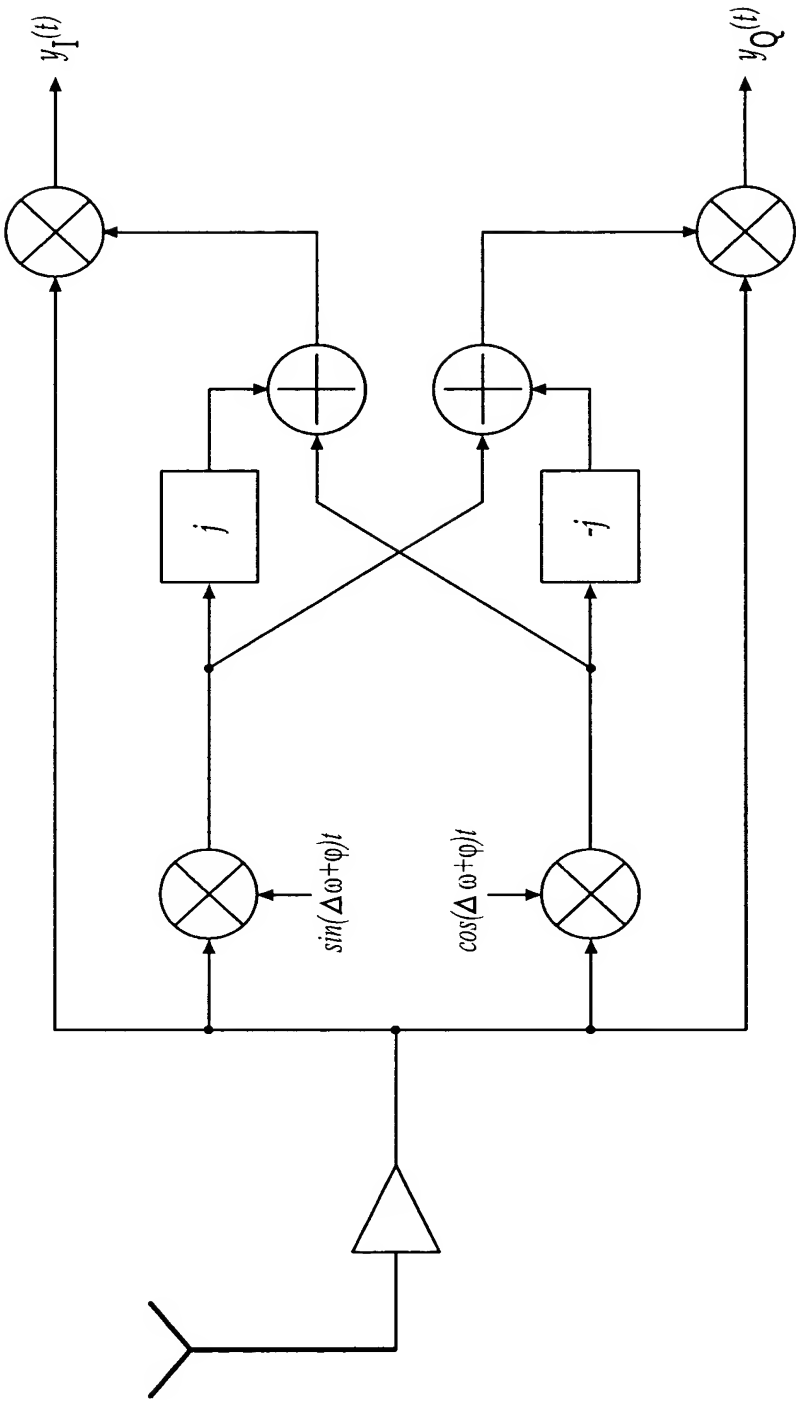

FIGURE 23

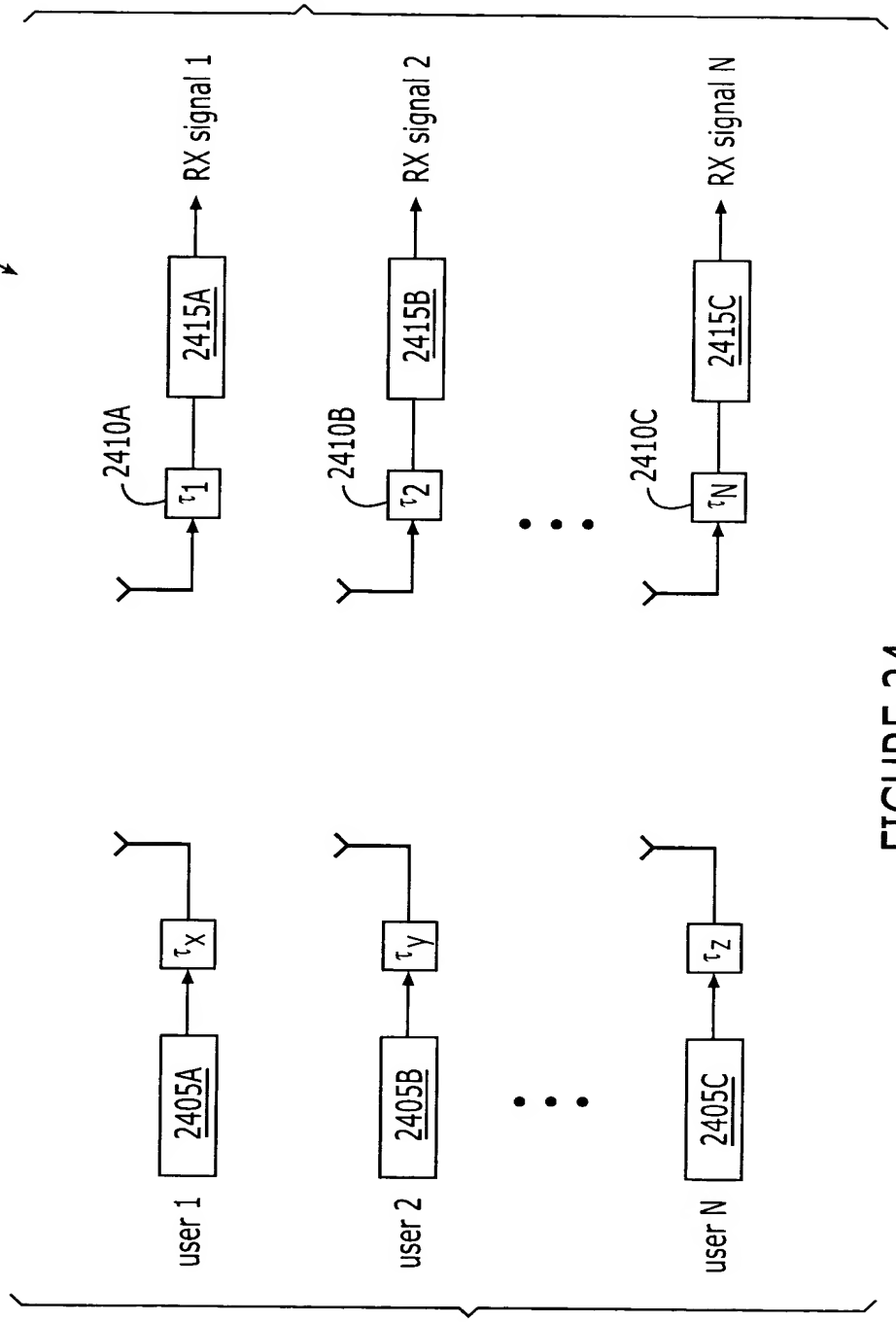
2400
RX signal 1
RX signal 2
RX signal N
2410A
2410B
2410C
2415A
2415B
2415C
τ1
τ2
τN
2405A
2405B
2405C
τx
τy
τz
user 1
user 2
user N

FIGURE 24

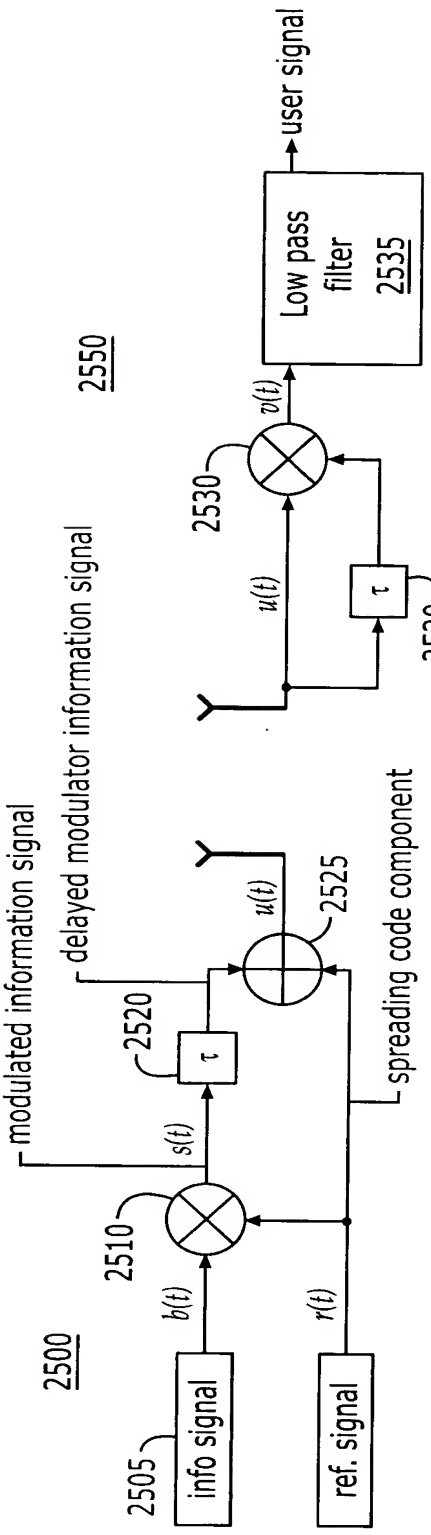
2500
2505
info signal
b(t)
2510
r(t)
ref. signal
modulated information signal
s(t)
2520
τ
delayed modulator information signal
u(t)
2525
spreading code component
u(t)
2520
τ
2530
v(t)
2550
Low pass filter 2535
user signal

FIGURE 25

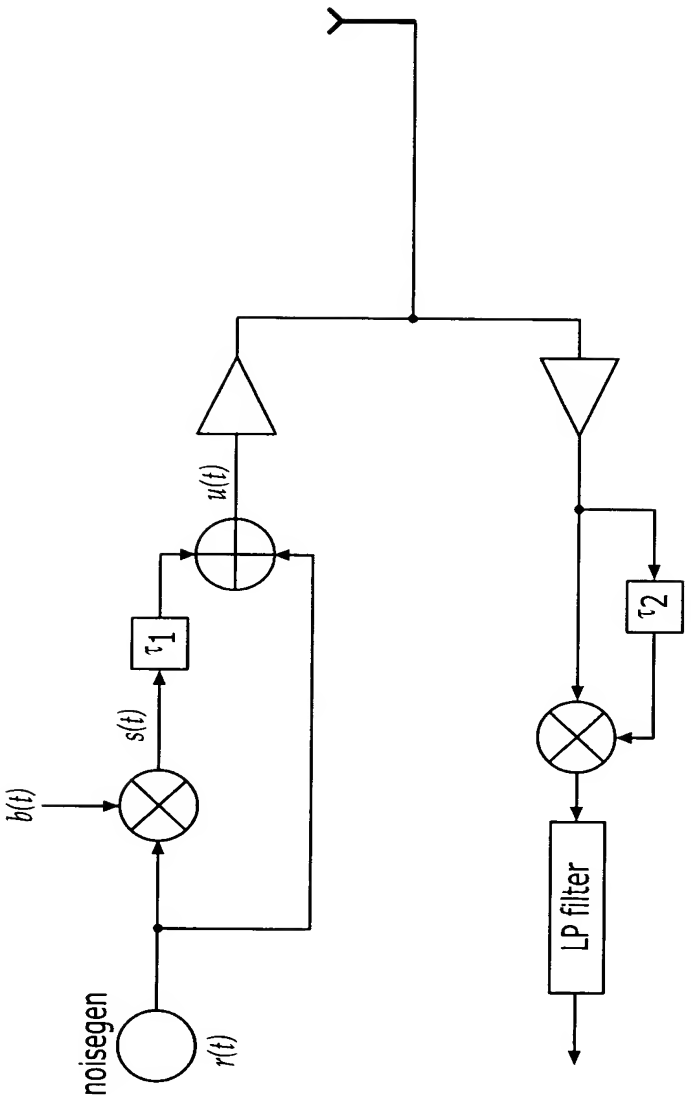

FIGURE 26

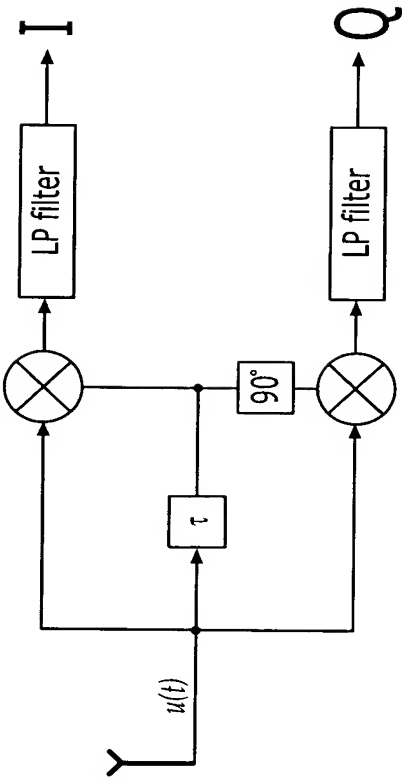

FIGURE 27

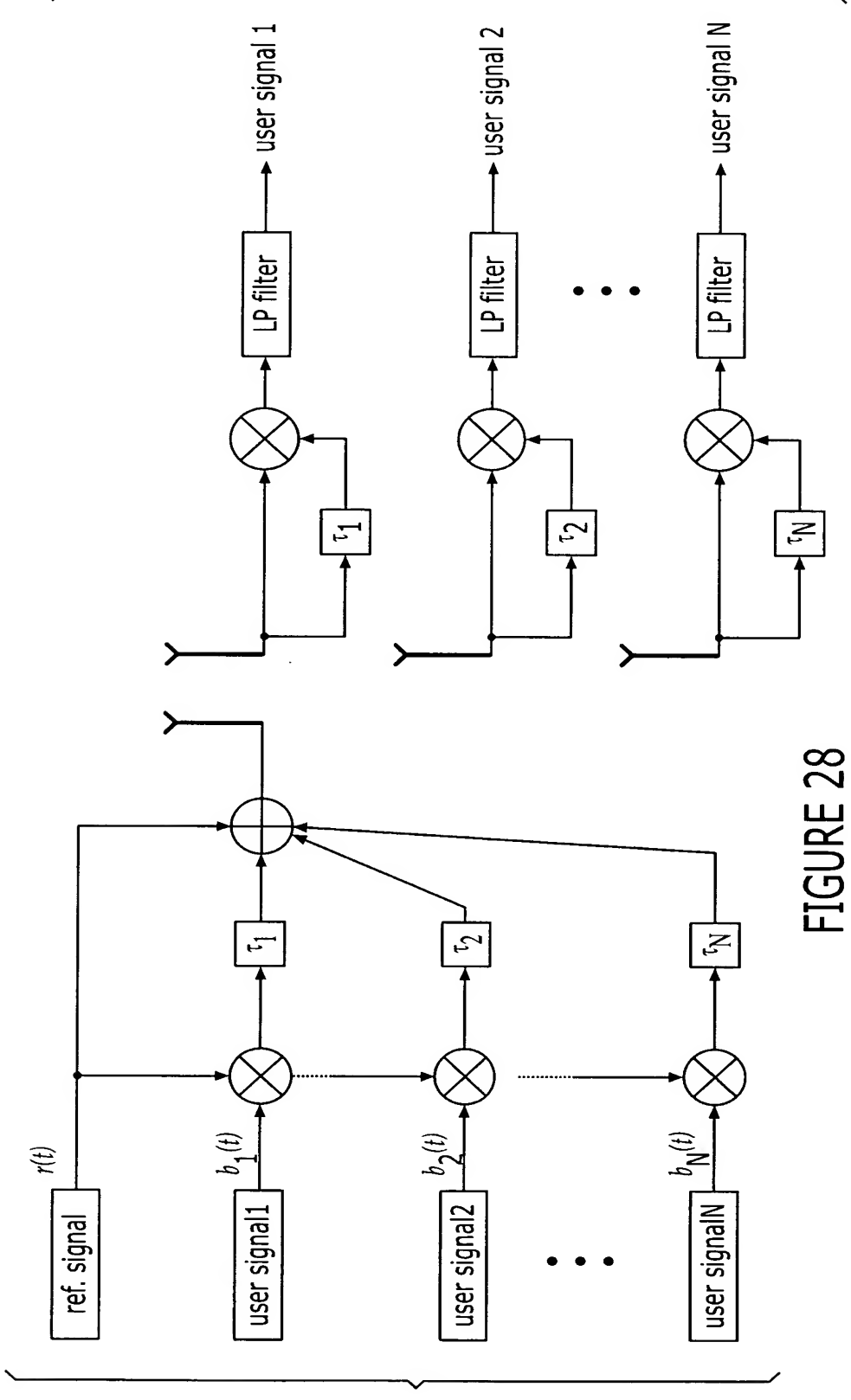
ref. signal
r(t)
user signal1
b1(t)
user signal2
b2(t)
user signalN
bN(t)
τ1
τ2
τN
LP filter
LP filter
LP filter
user signal 1
user signal 2
user signal N

FIGURE 28

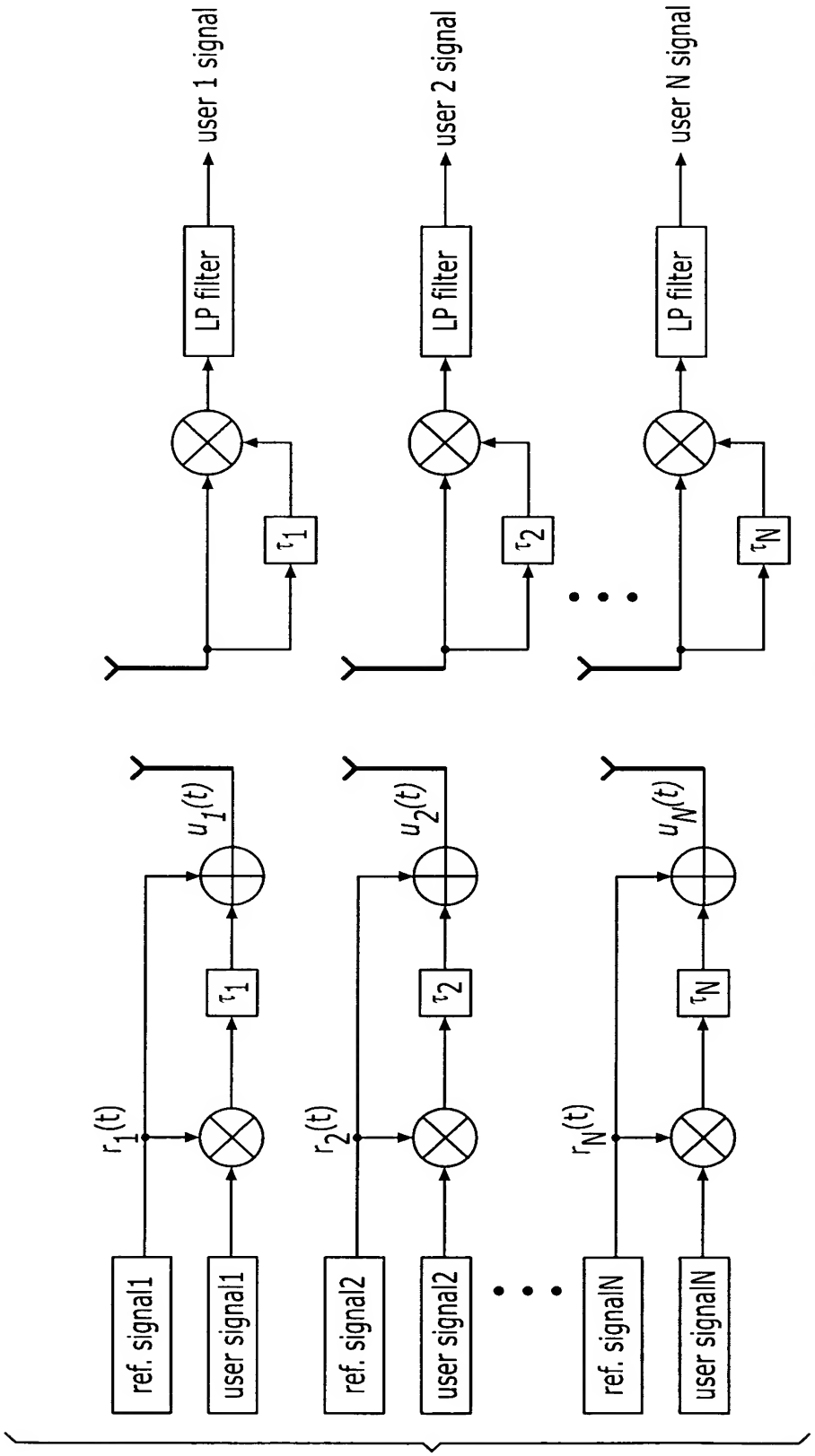
ref. signal1
user signal1
$r_1(t)$
τ_1
$u_1(t)$
LP filter
user 1 signal
ref. signal2
user signal2
$r_2(t)$
τ_2
$u_2(t)$
LP filter
user 2 signal
ref. signalN
user signalN
$r_N(t)$
τ_N
$u_N(t)$
LP filter
user N signal

FIGURE 29

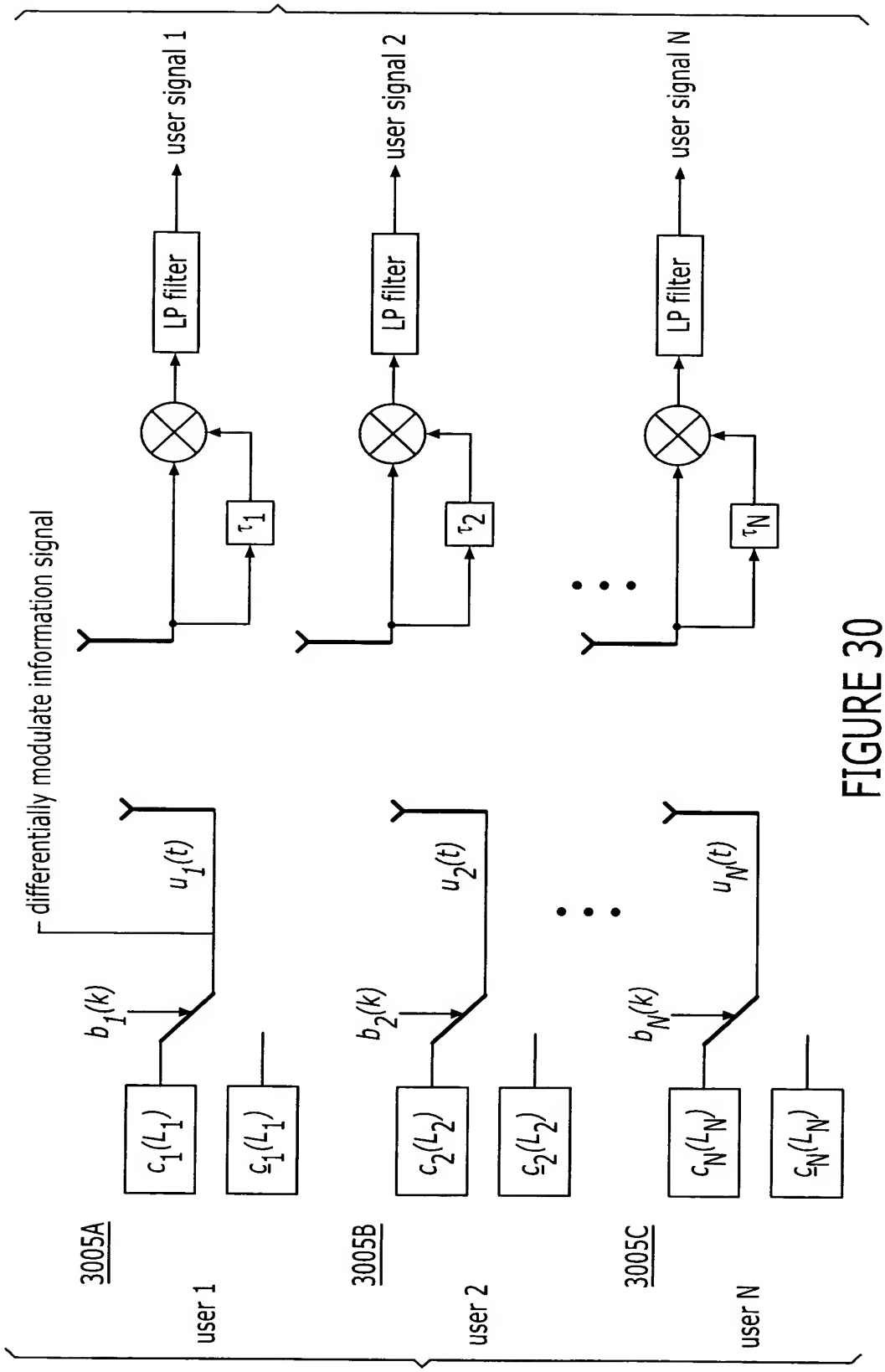
differentially modulate information signal
3005A
user 1
$b_1(k)$
$c_1(L_1)$
$\bar{c}_1(L_1)$
$u_1(t)$
τ_1
LP filter
user signal 1
3005B
user 2
$b_2(k)$
$c_2(L_2)$
$\bar{c}_2(L_2)$
$u_2(t)$
τ_2
LP filter
user signal 2
3005C
user N
$b_N(k)$
$c_N(L_N)$
$\bar{c}_N(L_N)$
$u_N(t)$
τ_N
LP filter
user signal N

FIGURE 30

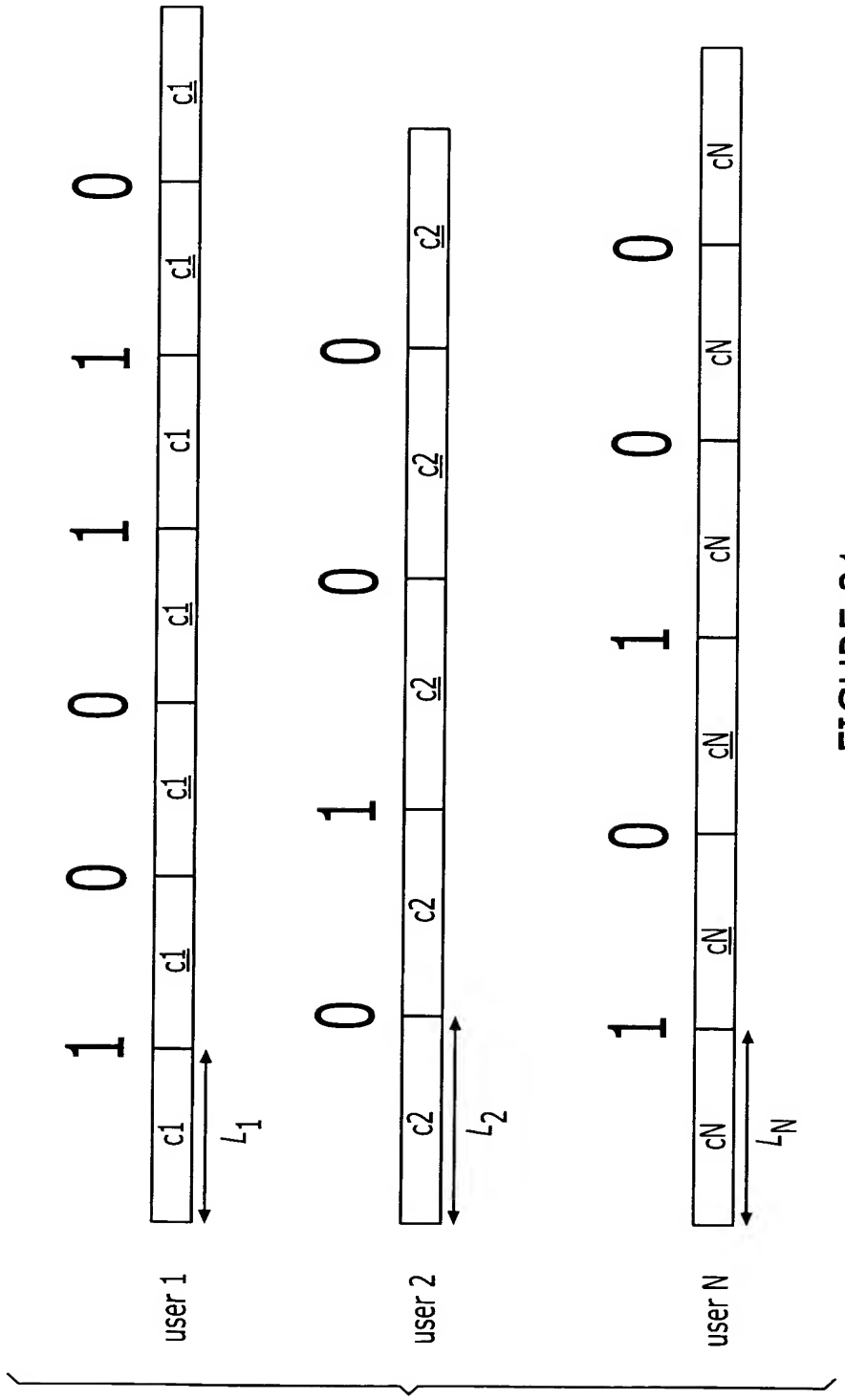
1 0 0 1 1 0
c1 c1 c1 c1 c1 c1
L_1
user 1
0 1 0 0 1 0
c2 c2 c2 c2 c2 c2
L_2
user 2
1 0 1 0 0 0
cN cN cN cN cN cN
L_N
user N

FIGURE 31

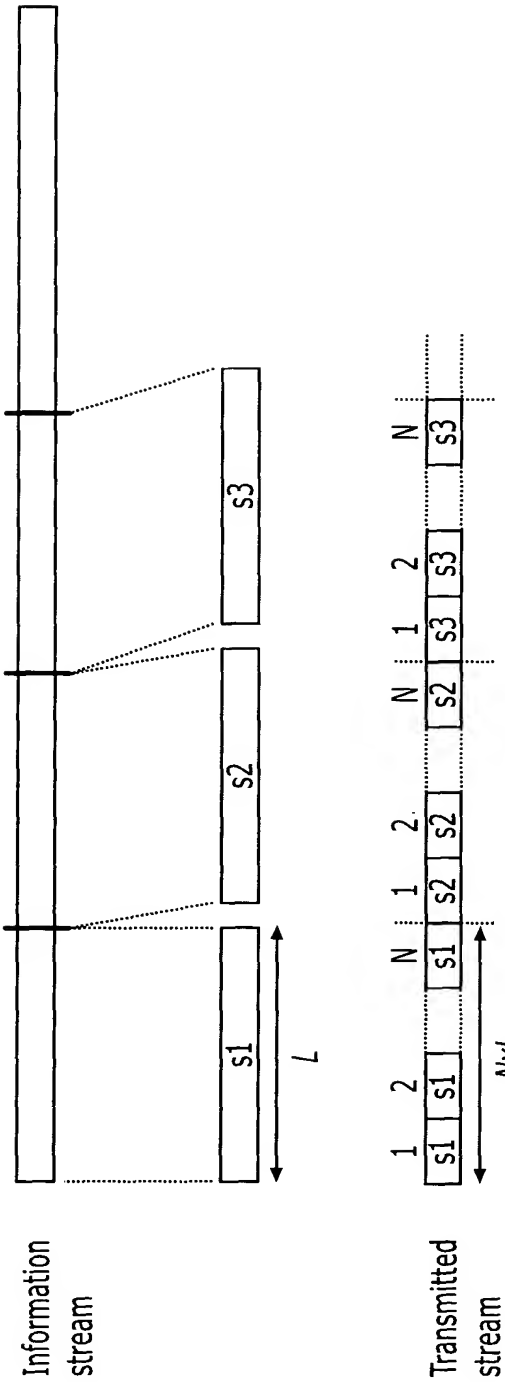
Information stream
s1
s2
s3
L
Transmitted stream
1
2
N
1
2
N
1
2
N
s1
s1
s1
s2
s2
s2
s3
s3
s3
NxL

FIGURE 32

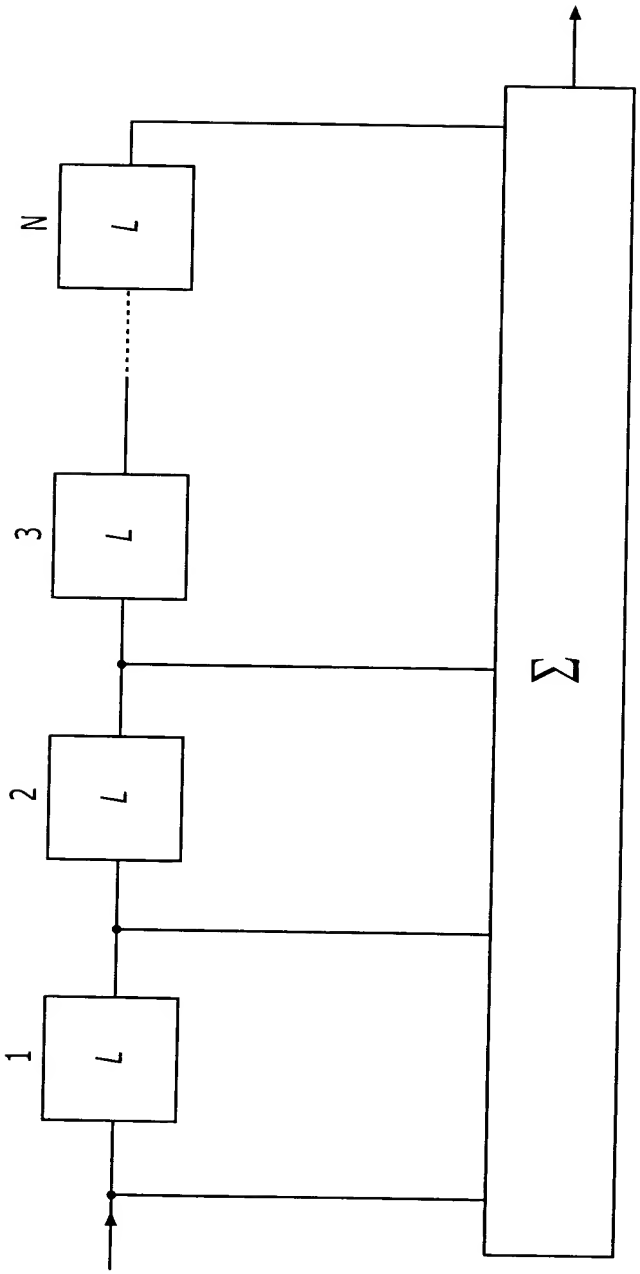

FIGURE 33

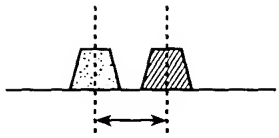

FIGURE 34A

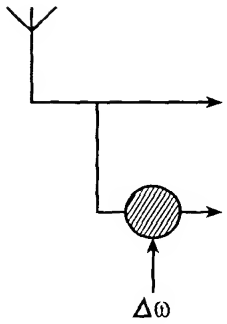

FIGURE 34B

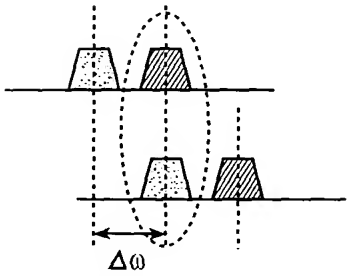

FIGURE 34C